

# Understanding Relationships Among Trauma, Post-Traumatic Stress Disorder, and Health Outcomes

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Literature reviews have documented that exposure to trauma is related to adverse health outcomes across domains of self-reported health, morbidity, mortality, and utilization of health services.<sup>1-4</sup> In this paper, we describe an integrative model that relates trauma to physical health through psychological, biological, behavioral, and attentional mechanisms. We use material presented elsewhere to support the argument that posttraumatic stress disorder (PTSD) is the key mechanism through which trauma leads to poor health.<sup>5</sup> We then discuss clinical, systems, and policy implications. The paper ends with an agenda proposal for basic and applied research.

## A MODEL RELATING TRAUMA EXPOSURE TO PHYSICAL HEALTH

The question of mechanism is crucial to understanding the relationship between traumatic exposure and physical health. Knowing which factors lead to poor outcomes can facilitate detection of vulnerable individuals and implementation of preventive strategies to reduce risk. An understanding of mechanisms also helps to make a plausible case for causality, which is important because the study of traumatic stress in humans is limited to correlational designs.

Figure 1 depicts a model that builds upon one proposed by Schnurr and Jankowski<sup>6</sup> to explain ways in which PTSD could lead to adverse health outcomes. We have expanded their model to include traumatic exposure in order to address the question of how a traumatic event, outside the individual who experiences it, leads to changes within the individual. The model assumes that a distress reaction following traumatic exposure is essential for precipitating changes in health status or other aspects of a person's well being. The only exception to this rule is the case of injury or illness incurred during the traumatic event. Although most trauma survivors are not injured or exposed to disease,<sup>7-9</sup> such trauma-related experiences obviously could affect health independent of distress. Even then, however, a distress response and its consequences are likely to accompany any threat to physical integrity, because trauma-related injury is associated with increased risk of developing PTSD.<sup>10-12</sup>

In our model, PTSD is proposed as the primary pathway through which trauma leads to poor health. Prior reviews have emphasized the role of PTSD as a mediator of the relationship between traumatic exposure and poor health.<sup>13</sup> The evidence presented by Green and Kimerling<sup>14</sup> is also highly consistent with the hypothesized mediational role of PTSD. Some studies have used regression procedures to demonstrate that the relationship between exposure and health is eliminated or substantially reduced when PTSD is added to a multivariate model.<sup>15-17</sup> Other studies have used path analysis to show that the effects of exposure are primarily indirect, through PTSD.<sup>18-20</sup> One study<sup>21</sup> divided trauma survivors into groups with and without PTSD, and found particularly strong support for the importance of PTSD: only the PTSD group had poorer health in comparison with traumatized and non-traumatized comparison subjects without PTSD.

Significant distress reactions other than PTSD could also mediate the relationship between trauma exposure and physical health. Support for this possibility comes from several sources. First of all, PTSD does not mediate all of the effect of traumatic exposure on health. For example, Taft and colleagues<sup>22</sup> found that 42% of the effect of combat exposure on the number of health conditions reported by Vietnam veterans was direct, ie, not mediated through

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PTSD or other variables. Some internal mechanism is needed to explain findings like these. Second, although a few studies have found a mediational role for non-PTSD distress,<sup>26</sup> this evidence is ambiguous because PTSD was not ruled out or included in the multivariate models. Third, the adverse health outcomes associated with depression<sup>27</sup> indicate that an individual who develops depression following a traumatic event should be at increased risk of adverse health outcomes. Likewise, an individual who experiences a chronic stress reaction other than PTSD should be at increased risk too.<sup>28,29</sup> Generally speaking, however, studies of health outcomes in depression and chronic stress have not ruled out PTSD as a mediator.

Stronger evidence for the independent contribution of depression and other disorders comes from studies that take both PTSD and non-PTSD disorders into account.<sup>27,30</sup> Nevertheless, these same studies show that PTSD has an effect that is distinct from other disorders. We discuss allostatic load<sup>31,32</sup> as an explanation for this distinctiveness. First we describe the mechanisms through which traumatic exposure and PTSD affect physical health.

### Components of the Model

PTSD and other significant distress reactions that develop as a result of exposure to a traumatic event are assumed to influence physical health through psychological, biological, behavioral, and attentional mechanisms. Given the limited evidence available about the health effects of depression and disorders other than PTSD in trauma survivors, we focus primarily on PTSD in our discussion of these mechanisms, making reference to other disorders when possible.

**Psychological mechanisms.** PTSD can substantially change numerous aspects of psychological functioning. Several of these changes have been linked to poor health in their own right. Depression was discussed above in the context of distress reactions that could initiate processes affecting physical health. Depression is frequently comorbid with PTSD, occurring in about half of all PTSD cases.<sup>33</sup> Although a history of depression and other psychiatric disorders is a risk factor for developing PTSD, retrospective and prospective analyses have found the likelihood of an episode of depression to be significantly increased among trauma-exposed individuals who develop PTSD, relative to those who do not.<sup>34</sup> Depression, therefore, may affect physical health not only as a primary reaction to trauma exposure, but typically will do so as a consequence of PTSD. Ford highlights several biological correlates of depression that could lead to cardiovascular disease: greater platelet activation, decreased heart rate variability, and greater likelihood of hypertension.<sup>35</sup>

PTSD may be related to poor health through comorbid anxiety and panic,<sup>36</sup> which are elevated in individuals with PTSD.<sup>37</sup> Anxiety, in turn, is strongly related to car-

diovascular morbidity and mortality.<sup>38</sup> Panic disorder is interesting because many panic-attack symptoms involve the cardiovascular system. We discuss panic more fully below because the effects of panic disorder on physical health are likely due to heightened symptom perception, rather than biologically-grounded disease processes.<sup>39</sup>

Dissociation is another psychological mechanism that may link trauma exposure to poor physical health outcomes, in part due to the strong relationship between dissociation and PTSD.<sup>40</sup> A relatively high proportion of individuals with severe childhood abuse, or other extreme traumas like torture, report dissociation. Dissociation, in turn, has been linked with a number of somatoform-type illnesses or multiple idiopathic physical symptoms (MIPS). Dissociation may serve to mediate the link between trauma and somatization.<sup>41</sup> Dissociation may also be implicated in attentional processes linking trauma with health outcomes.

As Aldwin and Yancura<sup>42</sup> indicate, PTSD is associated with the use of coping strategies that themselves have been linked to adverse health outcomes: less problem-focused, more emotion-focused strategies. There are two different types of strategies, in which people can engage in a lot, a little, or both. Problem-focused or instrumental strategies are associated with more favorable health outcomes, whereas emotion-focused, and particularly avoidant strategies, are associated with poorer health outcomes. Most of these effects appear to be direct, such as avoiding seeking medical attention for a health problem. However, some of the relationship between coping and health appears to be mediated through negative affect (a finding consistent with our model).

Hostility is another psychological correlate of PTSD that could lead to poor health.<sup>43</sup> Hostility is associated with greater likelihood of cardiovascular disease.<sup>44</sup> Although behavioral factors such as smoking may play a role, a primary mechanism is assumed to be the tendency of hostile individuals to show greater sympathetically-mediated cardiovascular responses to provocation stressors, and lesser parasympathetic response to the sympathetic activation.<sup>45</sup>

**Biological mechanisms.** Friedman and McEwen describe the significant alterations of neurobiological systems in PTSD.<sup>46</sup> At the core are alterations of the two primary systems of the stress response: the locus coeruleus/norepinephrine-sympathetic system (LC/NE) system and hypothalamic-pituitary-adrenal (HPA) systems. Individuals with PTSD have dysregulation of the HPA axis, resulting in higher or lower levels of cortisol, increased number of glucocorticoid receptors, and increased receptor sensitivity. Individuals with PTSD also have elevated basal adrenergic levels and adrenergic reactivity.

Friedman and McEwen discuss how alterations of the HPA and LC/NE systems could affect the entire body.<sup>47</sup> It is important to understand these primary alterations in light of the interactions among the immune, nervous, and

endocrine systems." For example, Dougall and Baum mention that cytokines, which are secreted by the immune system, affect the central and peripheral nervous systems, which in turn affect immune cells.<sup>11</sup>

Friedman and McEwen's review indicates that the biological correlates of PTSD are similar to the biological correlates of chronic stress.<sup>12</sup> Early research indicated potentially important differences between the two regarding cortisol levels (high in stress, low in PTSD) and glucocorticoid receptor sensitivity (low in stress, high in PTSD). More recent findings indicate elevated cortisol in PTSD,<sup>13</sup> as well as marked individual differences and phasic alterations.<sup>14</sup> Friedman and McEwen attempt to resolve the conflicting findings by suggesting that HPA axis function in PTSD can be characterized in terms of both tonic and phasic abnormalities.<sup>15</sup> Mason and colleagues<sup>16</sup> offered the interesting explanation that cortisol levels reflect the balance between undifferentiated emotional arousal, or "engagement" (associated with higher levels), and "disengagement" defense mechanisms (associated with lower levels). If so, individuals with PTSD could appear relatively low or high, depending on the this balance.

The variable findings on the HPA axis in PTSD prevent firm conclusions as to whether the health effects of HPA axis alterations in PTSD are those associated with high or low cortisol. Because cortisol has immunosuppressive effects, the implications for the immune system are especially important. Low levels of cortisol in PTSD might lead to disorders associated with activation of immune-mediated inflammation, eg, rheumatoid arthritis.<sup>17</sup> However, enhanced receptor sensitivity and high levels of cortisol in PTSD might lead to disorders involving decreased immune function, eg, infectious disease, and suppression of immune-mediated inflammation.<sup>18</sup>

Dougall and Baum<sup>11</sup> and Friedman and McEwen<sup>15</sup> show that the findings to date fail to resolve which of these alternatives is most likely. Dougall and Baum attempt to reconcile the findings by examining outcomes as a function of the timing of the traumatic stressor, given evidence that acute stressors are associated with enhanced immune function (and worsening of diseases like rheumatoid arthritis),<sup>19</sup> and chronic stressors are associated with decreased immune function. However, there is evidence of both enhancement and suppression of the immune system in PTSD, as well as evidence that PTSD is associated with disorders that could result from enhancement<sup>20-22</sup> and suppression.<sup>23</sup> Friedman and McEwen propose that PTSD is associated with a tonic state of immunosuppression and with phasic episodes of immune system enhancement.<sup>15</sup> This is an interesting hypothesis that bears further examination. Friedman and McEwen also note other pronounced biological changes associated with PTSD that are mostly similar to changes associated with chronic stress syndrome, so it appears safe to conclude that PTSD

should be similar in its biological consequences to extreme levels of chronic stress, and perhaps may be distinct in terms of health effects of HPA axis dysregulation.

The preceding discussion illustrates several points of interaction between psychological and biological mechanisms. We wish to emphasize the interdependence and inseparability of these mechanisms. There are several plausible biological pathways through which the psychological correlates of PTSD could affect physical health, such as the balance between numbing and hyperarousal symptoms.<sup>24</sup> The reverse should be true as well; that biological correlates of PTSD affect health through psychological pathways. Both, in turn, could affect behavior, although we propose that biological mechanisms affect behavior by eliciting responses perceived as distressing at some level.

*Attentional mechanisms.* Traumatic exposure and PTSD are associated with illness behaviors such as reporting somatic symptoms<sup>25-27</sup> and seeking medical care.<sup>28</sup> Many explanations have been offered for why trauma, in particular, might increase negative health perceptions and illness behavior.<sup>29-31</sup> Pennebaker has proposed that the propensity to report somatic symptoms following traumatic exposure could result from four non-mutually exclusive sources.<sup>32</sup> The first source is actual biological changes resulting from the exposure. The second source is the use of symptom-reporting as a strategy to avoid thinking about trauma; the assumption being that focusing on physical symptoms is less distressing than focusing on psychological distress. A third source, related to the use of avoidance, is the mislabeling of autonomic and emotional consequences of trying to suppress thinking about trauma. The last source is secondary gain, or reporting symptoms to elicit help and comfort from others.

Another possibility is conditioning. Resnick and colleagues suggest that because physiological arousal is part of the initial "alarm" response to a traumatic event, arousal symptoms can trigger cognitions (such as threat to life or danger) that cause individuals to believe their symptoms require medical attention.<sup>33</sup> Panic disorder is frequently comorbid with PTSD,<sup>34,35</sup> and many trauma survivors interpret symptoms of a panic attack as indicating a medical emergency.<sup>36</sup> The effects of panic disorder on physical health, then, are likely due to increased sensitivity to symptoms, as well as to behavioral factors.<sup>37</sup> Thus, panic and anxiety symptoms in trauma survivors may increase illness behavior directly through attentional mechanisms because the psychiatric symptoms are somatic in nature (eg, rapid heartbeat, sweating, and breathing difficulty).

Another important attentional mechanism is somatization, "a tendency to experience and communicate somatic distress and symptoms unaccounted for by pathological findings, to attribute them to physical illness, and to seek medical help for them."<sup>38-40</sup> Trauma and PTSD are associated with somatization and somatoform disorders, including MIPs.<sup>41-43</sup>

Engel argues against a simple cause-effect model for the association between traumatic exposure and somatization,<sup>11</sup> and we agree. Individual, social/contextual, and triggering factors cause individuals to somatize.<sup>12</sup> Green and colleagues present childhood trauma as one of a number of dispositional and experiential variables that could contribute to a tendency to somatize.<sup>13</sup> Social and contextual factors include illness or somatization in family members, as well as a chaotic childhood environment, secondary gain, social support, and cultural influences. Precipitating factors include traumatic exposure and other acute life-stressors, psychiatric illness, and personal or familial medical illness. Other factors, like comorbid psychiatric disorders and dissociation, may also mediate the relationship of trauma to somatization, as mentioned previously.

Attentional mechanisms can also involve decreased attention to medical problems or conditions. If a person is dissociating, he or she may be out of touch with physical pain or discomfort, through self-generated analgesia or anesthesia,<sup>14</sup> such that real physical problems may go unnoticed and, by extension, untreated, exacerbating a medical condition or potentially rendering it more severe or dangerous—a situation that therapists trained to look for somatization may miss.<sup>15</sup> Haven recently described a patient with severe childhood trauma and current dissociation who did not experience pain associated with a malignant tumor that would have been painful to most people.<sup>16</sup> The lack of pain cues prolonged the identification of the tumor and the seeking of healthcare, and threatened his life.

**Behavioral mechanisms.** Health-risk behaviors account for a substantial proportion of deaths in the United States.<sup>17</sup> Roughly speaking, poor health practices fall into two categories: substance use or abuse (ie, smoking, alcohol, drugs, and food) and failure to engage in preventive strategies (ie, exercise, diet, safe sex, and regular healthcare). Rheingold and colleagues document evidence that trauma exposure and PTSD are associated with both types.<sup>18,19</sup> Although PTSD has substantial effects on physical health, even when the effects of behaviors such as smoking are statistically controlled, these behaviors are an important part of the pathway from traumatic exposure to poor health.

Rheingold and colleagues<sup>18</sup> discuss self-medication as a primary reason why trauma survivors engage in behaviors such as smoking and alcohol abuse, noting that this kind of coping strategy may backfire. For example, alcohol abuse may temporarily reduce distress but eventually lead to medical illness, and substance withdrawal may exacerbate symptoms of PTSD and other psychiatric disorders. Failure to decrease substance abuse, as well as failure to engage in preventive behaviors, likely results from factors that decrease motivation or the ability to maintain a behavior change regimen, such as low self-efficacy,<sup>20</sup> lack of

social support,<sup>21</sup> and depression.<sup>22</sup> Failure to engage in preventive behaviors may also result from factors that impair the acquisition or use of necessary information, such as anxiety preventing the use of condoms in those with a history of sexual assault, despite the fact that the individuals know of the importance of protected sex.<sup>23</sup>

### Interaction Among Components

According to our proposed model, there are multiple pathways through which traumatic exposure could lead to poor health. As a way to understand how these many dimensions interact, Schnurr and Jankowski<sup>24</sup> suggested the concept of allostatic load:

*The strain on the body produced by repeated ups and downs of physiologic response, as well as the elevated activity of physiologic systems under challenge, and the changes in metabolism and wear and tear on a number of organs and tissues.*<sup>25,26,27</sup>

Allostatic load is particularly useful for understanding the health outcomes associated with traumatic exposure because the construct emphasizes the cumulative and interactive effects of biological, psychological, and behavioral alterations, including those that alone would be insufficient to produce disease. For example, the elevated levels of arousal and hyper-reactivity in PTSD may not by themselves cause cardiovascular disease, but may do so when coupled with behavioral risk factors that are also associated with PTSD. Schnurr and Jankowski also suggested that allostatic load might be greater in PTSD than in other disorders, due to the number and chronicity of factors that produce “wear and tear” in PTSD. This possibility has yet to be tested.

Friedman and McEwen provide further detail about allostatic load, and offer a new and exciting parallel construct called allostatic support, which they define as “any non-homeostatic biopsychosocial strategy that will oppose allostatic load.”<sup>28,29,30</sup> Allostatic support may reflect inherited protective tendencies, and may also reflect interventions designed to counter allostatic load. Allostatic support is related to the concept of “physiological toughening,” proposed by Densitbier<sup>31</sup> to account for evidence that stressor exposure can lead to adaptive, rather than maladaptive, responses in both animals and humans. Physiological toughening may be a mechanism that promotes allostatic support.

If allostatic support works like allostatic load, then numerous small positive changes could add up to heightened resilience. One implication of Friedman and McEwen’s proposal,<sup>32</sup> then, is that interventions aimed at improving physical health in trauma survivors (or other populations<sup>33</sup>) could be successful even if targeting multiple small improvements, rather than major changes.

## Other Considerations

Physical health is a multidimensional construct that is expressed on a continuum of increasing complexity, ranging from biological and physiological variables, symptoms, functional status, health perceptions, and finally, health-related quality of life.<sup>10</sup> Given this complexity, physical health is influenced by many factors in addition to those depicted in Figure 1. We do not detail these factors, but remind readers to consider that health is also affected by personal characteristics such as age, gender, and genetic makeup; social factors such as socioeconomic status, social support, and proximity to sources of preventive care; and ethnic and cultural background;<sup>11,12</sup> and that these factors interact. For example, Macera and colleagues<sup>13</sup> suggested that adverse health outcomes in African Americans, relative to White Americans, might result from an interaction between racial stratification and discrimination, on the one hand, and socioeconomic status on the other. It would be helpful to know whether personal and sociocultural factors also interact with trauma and PTSD; for example, to what extent the likelihood of cardiovascular disease is increased in a genetically-predisposed individual who also has PTSD. This and other questions for future research are discussed below.

## CLINICAL, SYSTEMS, AND POLICY IMPLICATIONS OF THE RELATIONSHIP BETWEEN TRAUMA AND HEALTH

The relationships among trauma, PTSD, and health suggest that it is important to make these links in clinical settings and practice. Green and Kimerling<sup>1</sup> have discussed the issues surrounding screening for trauma and for PTSD in primary-care settings. We extend this discussion to include a range of clinical, training, and policy issues that are suggested by the links and pathways just proposed. Although we agree that primary prevention—that is, the prevention of trauma exposure in the first place—is a crucial aspect of reducing the burden of trauma-related problems on the healthcare system, as well as the suffering of exposed individuals, it is outside of the scope of the present discussion, and we refer the reader to other sources.<sup>14,15</sup> The remaining discussion assumes that exposure has occurred, and considers ways in which the healthcare system and individual providers can ease psychological distress among victims, help to make the medical setting more “user friendly” for patients, decrease the artificial distinction between mental and physical health, increase the appropriate use of scarce health resources, and reduce the costs of trauma to the system at large.

### Implications for Primary Care Settings

**Identification.** Before there can be an intervention to reduce the psychological and physical health consequences of traumatic exposure, those who have been exposed must

be identified. Green and Kimerling<sup>1</sup> note that studies of the links between trauma and health have tended to recommend universal screening procedures. Whereas they suggest some of the drawbacks and limitations of screening, they also note that screening with enhanced treatment possibilities has proven beneficial to the patient, and possibly even cost-effective, for the treatment of depression.<sup>16</sup> Furthermore, knowing whether someone is a trauma survivor, and particularly whether he or she has a mental disorder, is important for appropriate assessment of the patient's medical and mental health status, potential needs, and for developing a treatment plan. Routine or intermittent screening, using short self-report screens in the context of collecting medical history information, is one easy and relatively inexpensive way to obtain such information, and numerous instruments are now available for this purpose.

Another approach is to target inquiries and discussions of trauma and distress to certain types of clinical encounters. For example, based on qualitative studies, Miller<sup>17</sup> characterized family-practice visits as being of three types, which he called “routine,” “ceremony,” or “drama.” Although this classification was one suggested for determining when to involve family members or to obtain more information, it seems appropriate for trauma as well. Only drama visits trigger physician inquiries about what may be going on that is not apparent. Examples of these types of visits include a crisis in a chronic-disease course, family discord, or the presentation of a complex syndrome with an hypothesized psychological component (such as chronic fatigue or low back pain). These visits revolve around uncertainty, conflict, physician-patient disagreement, non-adherence, or the delivery of bad news. At these times, the physician might ask questions that would help clarify the nature of the visit and the problem (eg, “What brings you here today? What worries you most about [presenting problem]? What do you hope that I can do for that?” etc). There are also “quick checks” that can be woven into even the routine visit (eg, “Has anything changed at home? Do you feel safe at home? How is your family doing?”) that give the patient an opening to report events that may be problematic (W. Miller, personal communication, October 2001). Regardless of how the information is obtained, there needs to be a plan for follow-through if trauma experiences or distress are uncovered.

In addition to screening for trauma exposure and PTSD, it is important for physicians to screen for health-risk behaviors such as smoking, substance abuse, and failure to prevent negative health problems.<sup>18</sup> This may be especially important if those behaviors are used as negative coping strategies to deal with trauma-related memories, triggers, affect, or symptoms.<sup>19</sup> These behaviors are dangerous and contribute to poor health, whether or not they are related to trauma; but if they are coping strategies to deal with traumatic exposure, they may need to be

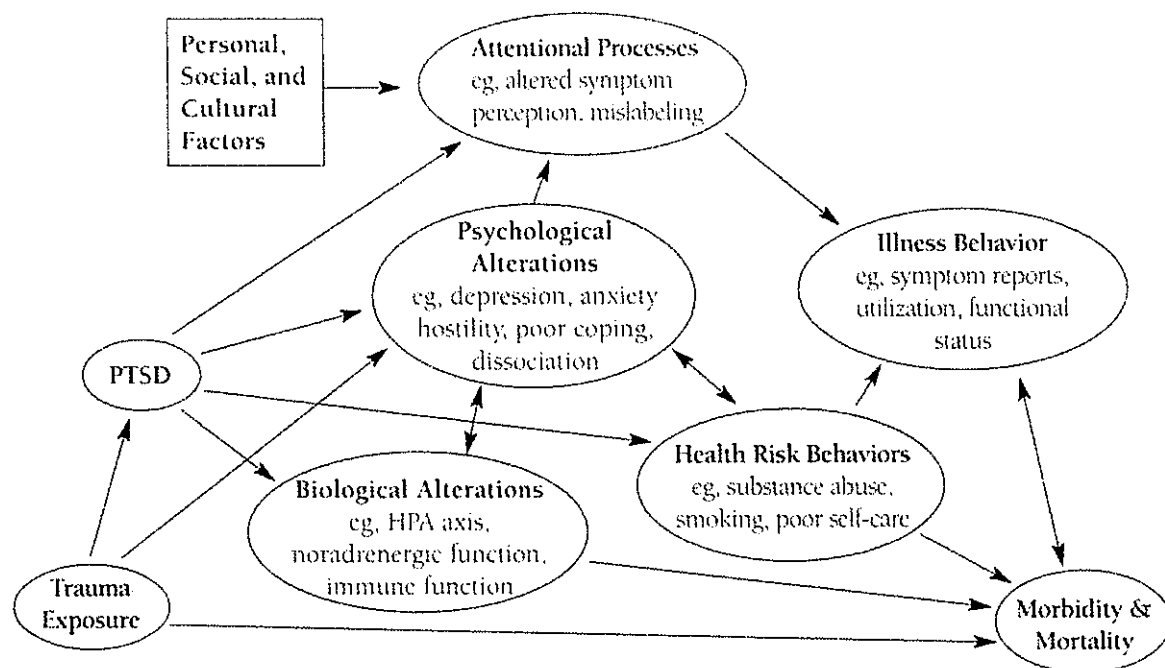


FIGURE 1 A model relating traumatic exposure and PTSD to physical health outcomes. Schnurr and Green, 2003 (adapted with permission from Schnurr and Jankowski; Copyright 1999 by W.B. Saunders Co.)

addressed somewhat differently. As Rheingold and colleagues point out, eliminating a negative coping response without replacing it with a healthier one runs the risk of failing or of encouraging even more negative coping.<sup>12</sup> Explaining to patients how they may be using these behaviors to cope may help to support the importance of dealing with the problem behaviors and the need for mental health services.

**Training of caregivers in primary care settings.** Many trauma researchers have called for the training of non-psychiatric physicians and other caregivers in the nature and consequences of trauma, and this approach appears to be a necessary, if not sufficient, condition for the improvement of services to survivors. The range of training needs for primary-care providers is potentially wide. These needs encompass several areas, including *knowledge about mental health issues* (eg, how trauma exposure relates to physical health, information about mental disorders, links between exposure and health risk behaviors, the potential of some medical procedures to be triggers for earlier traumatic experiences, and screening strategies); *knowledge about interactions and communications with patients* (eg, how to refer patients to specialty care, listening and being sensitive to survivors' needs for validation, providing education to trauma survivors, providing treatment [usually medication] to trauma survivors); and *knowledge about community issues* (eg, legal reporting

requirements, community resources for victims, etc). Providers may not be able to address each issue with each patient. However, they do need to be aware of trauma reactions, as well as when and how to address them with particular patients, and to consider how some aspects of appropriate care for trauma patients could be incorporated into their practice at various levels (eg, though education of staff, routine data collection, and spreading responsibility for education, recognition, and referral among providers and staff).

Presently, there is very little training in medical schools about trauma and its effects, although mental disorders are routinely taught in medical school psychiatry courses. Psychiatry residents may get some training in trauma-related issues, especially sexual and physical abuse, but one survey showed that they felt their instruction about child abuse, the focus of the survey, was insufficient.<sup>13</sup> Their exposure to trauma-related courses and training opportunities may depend upon the availability of local experts and the discretion of training directors. Non-physician mental health programs may do somewhat better in terms of introducing trauma content,<sup>14</sup> but clinicians generally rate these training programs as not sufficient in preparing them for practice.<sup>15,16</sup> In a survey of nurses, dentists, dental hygienists, physicians, psychologists, and social workers, a third of participants reported having received no educational content on child, spouse,

or elder abuse in their training programs.<sup>1</sup> Social workers, psychologists, and nurses reported the most training, whereas dental personnel reported the least. Family practice residents receive training in mental disorders, including some training in counseling, but trauma is less emphasized. The exceptions to these generalizations are those related to detection and reporting of current sexual or physical abuse, which is also taught in emergency medicine and pediatric programs. Training in medical and nursing schools, as well as in graduate mental health programs, needs to include modules on the effects of trauma. Furthermore, innovative curricula for teaching students about patient communication need to be developed or improved. One study indicated that medical students do not necessarily receive training in communication skills during their obstetrician-gynecology rotations.<sup>22</sup> This study also showed that having laywomen train medical students in the performance of a pelvic exam, an increasingly common medical school practice, significantly increased the students' interpersonal skills during an exam, suggesting the potential usefulness of involving patients in training professionals to communicate and respond sensitively to patients.

#### **Interventions by Primary Care Providers**

Once there has been an inquiry and a positive response to questions about current or past trauma exposure, the physician or caregiver has several options. One is to ask the patient whether he or she wants to discuss anything reported, or asking additional questions to get a clinical sense of their potential connection, psychologically or temporally, with the physical complaints for which the patient seeks treatment. A clear follow-up plan or procedure needs to be in place when significant trauma is recognized, especially if it is current. Another reasonable option is to schedule a follow-up visit to explore the impact of the trauma history more thoroughly. A nurse within a practice might be designated to follow up with patients and to explore options for those who need social services or mental health treatment. These procedures might result in referral to support services or education, a mental health consultation or referral, or treatment by the primary care physician for specific syndromes (ie, PTSD or depression), usually with medication. In addition, caregivers who have been trained to understand the possible triggering effects of medical and diagnostic procedures for trauma survivors can prepare patients for these.<sup>23</sup> Gynecologic procedures, dental procedures, and anesthesia are all situations in which patients with histories of abuse may experience heightened distress or even severe symptoms such as dissociation, and these can be avoided. Nurses and support staff can be trained to deal sensitively with traumatized women patients by recognizing some of the manifestations of fear and anxiety that may occur, for

example, during pelvic exams,<sup>24</sup> and by learning techniques to reduce anticipatory anxiety or fear.

If the provider suspects that the patient's symptoms are primarily due to *somatization*, certain management strategies may come into play. For example, care providers can help patients with somatization symptoms to understand that stress affects the body and one's physical health. Physicians may schedule more regular visits to discourage emergency care, and limit the use of diagnostic tests.<sup>25</sup> An important key to treating individuals with somatization disorder is a compassionate physician-patient relationship, with a key physician who coordinates care and serves as a gatekeeper for consultation of medical specialists.<sup>26</sup> The general approach to treatment is long-term observation, rather than diagnostic procedures. Acknowledging the patient's suffering, yet reassuring him or her that the symptoms most likely do not represent serious or disabling illness, may aid rapport and redirect the patient away from symptom complaints. It is also important to collect family and social histories, including mental disorders and substance abuse in family members, to help rule out bona fide medical conditions and enhance the detection of somatization.

#### **Patient Education and Empowerment Strategies**

To date, these have not been sufficiently explored, and few recommendations have been made for the development of such strategies that are not physician-driven. Yet, although physicians and other providers have a responsibility to educate and collaborate with their patients, not all do, for lack of time if nothing else. So it seems logical that patients take some of the responsibility themselves, and that appropriate materials and opportunities be developed for them, in and out of the doctor's office. Educational approaches have the potential to increase the patient's awareness of the interdependency of his or her mental and physical health. Patients can be helped to think about ways that they may take better care of themselves physically, with an eye toward improving their overall physical condition. Risk-reduction education around behaviors that have negative health consequences are also important,<sup>27,28</sup> and can be provided outside of the physician-patient relationship. Indeed, public health campaigns are already aimed at some of these behaviors, and trauma-focused materials could be developed as well. Patient-focused interventions might also be useful for trauma-related, patient-provider relationship problems of fear, discomfort, or overly dependent behavior. For example, Bassuk and colleagues<sup>29</sup> have shown that poor women with PTSD, compared with women exposed to violence but without PTSD, were more concerned that they would not get good care, did not trust their doctors, found medical staff rude, and felt that staff did not understand their problems. Education about how trauma and PTSD affect relationships, and how they might

affect interactions with caregivers, might help patients understand their roles in their interactions with caregivers. Given increased access to, and use of, websites for medical information, the Internet should be considered a resource in the development of materials for patients as well.

### **Implications for Mental Health Professionals**

For the clinician seeing patients in a mental health setting, more attention needs to be paid to physical manifestations of psychiatric illness and to helping patients understand the links between their psychological distress and their physical health.<sup>70</sup> Patients can be given normative information about physical and psychiatric reactions, symptoms, disorders, and treatment. Patients with PTSD and other disorders can be helped to understand how these psychiatric problems affect their physical health.<sup>71</sup> The patient's physical health problems and visits to non-psychiatric physicians should also be assessed and explored<sup>72</sup> to learn more about his or her general health history, as well as to increase the patient's awareness of the interdependency of mental and physical health.

### **Integrated Care Models**

In recent years, there has been a move toward more integrated models of care; that is, including primary care and mental health providers in the same setting. These models seem particularly appropriate when considering the physical health consequences of traumatic stress. The strong links between trauma and physical health, and among trauma, mental disorders (especially PTSD), and health, suggest that integrated models are likely to be the most appropriate for many trauma survivors, and may improve their access to care. Closer alliances between health and mental health care providers, both professionally and geographically, are appropriate for many reasons. Blount<sup>73</sup> describes nine reasons to integrate primary and mental health behavioral care, four of which seem particularly pertinent to the present discussion. First, integrated care reflects the way that most patients experience and present their distress—that is, in an undifferentiated form. Most patients who present in primary care have problems that are psychological in some way,<sup>74</sup> with less than 20% of patient visits linked to discoverable organic causes. Second, for problems that are clearly psychological in origin, primary care is still the predominant focus of treatment. Most patients prefer to get their mental health treatment in primary care settings<sup>75</sup> by their primary care providers, with only 11% wanting to be referred out. Patients may also feel abandoned if they are referred to another facility or provider.<sup>76</sup> Third, such an integrated setting, being closer to how the patient presents, is likely to increase adherence, and thus, produce better outcomes. For example, Katon and colleagues<sup>77</sup> found that 74% of the people with major depression in their integrated-treat-

ment condition showed significant symptom reduction, while only 44% of the patients with physician treatment and referral showed significant improvement. Fourth, even primary care physicians trained in mental health can't be expected to address the whole range of potential problems, and referrals are often not successful. Indeed, follow-through with referrals to mental health professionals is low, with estimates ranging from 10% to 50%.<sup>78-80</sup> Blount also points out that both parties are more satisfied under an integrated model, and that there does not tend to be an increase in costs.<sup>81</sup> Thus, integrated services are likely to increase real access to care, leading to better quality and outcomes.

For these reasons, we encourage mental health practitioners to seek out partnerships with primary care physicians, including mutual education and active exchange of information and patient referrals. Blount points out that collaboration can take a variety of forms, from a courtesy report of involvement with the patient, at the low end, to actively working together on a regular basis in delivering services, at the high end.<sup>82</sup> All forms are encouraged here. However, we hope that both groups, primary care providers and mental health professionals, will consider "on-site" arrangements where mental health practitioners actually spend time in the practice setting. Direct interventions by mental health professionals in primary care that are focused on specific disorders (primarily depression to date) have proved effective compared with usual care,<sup>83-85</sup> particularly for major depression. While some of the interventions that have been tested are relatively elaborate, even more modest interventions may improve access to care. For example, at Georgetown, two psychiatrists each spend one day per week at the family practice center run by Georgetown's Department of Family Medicine. The center serves a low-income population, many of whom are on Medicaid, and is a training site for the family medicine residents. The psychiatrists teach the family medicine residents about mental health issues, are available for consultation, and provide treatment. The study mentioned in Green and Kimerling's paper,<sup>6</sup> a treatment study for PTSD, screened for patients at this site. Although the rate of current PTSD screened (about 8%) was comparable to rates at public health clinics in the same county, all of the women who screened positive were already in mental health treatment for their PTSD, compared with almost none of those in the county clinics. Many factors vary among the sites, and the presence of psychiatry faculty at the setting indicates an interest in mental health issues on the part of this particular clinic to begin with. However, it seems likely that having mental health professionals on site, even though they may not be able to treat all of the practice's clients because of differences in insurance plans, contributed to the high proportion of women with PTSD being in treatment. Many practical suggestions for collaboration between mental



health and medical professionals, and especially for integration of health and mental health services, including how to go about establishing these, are delineated in a recent book.<sup>22</sup>

It is also important to underline that there are a range of interventions that may be appropriate for those having trauma-related problems. Treatment interventions are costly, even if they are cost-effective, and might best be reserved for patients who do not respond to less intensive approaches. They might also best be reserved for serious disorders, rather than subclinical symptoms<sup>23</sup> or discomfort and fear associated with medical procedures. For these latter problems, some of the approaches mentioned previously may be appropriate, such as reassurance from the provider, patient pamphlets, educational or support groups for patients,<sup>24</sup> training of office staff, practice-based case management approaches, and so forth. Mental health providers, especially psychologists, are trained to conduct preventive behavioral interventions related to coping and health risk behaviors.<sup>25</sup> Triage may be an important additional function that the mental health professional can serve, and stepped-care models<sup>26,27</sup> seem to make the best use of resources. These approaches will require thinking "outside the box" and will challenge the skills of the mental health professional, but would appear to be most likely to engage and help patients with prevention and mental health problems, including PTSD. Glenn<sup>28</sup> has suggested criteria for the involvement of mental health professionals in a patient's care, and Blount<sup>29</sup> has provided a process and a model for moving to this type of integrated treatment.

### **Implications for Public Policy and Systems Changes**

While individual providers and practices may make links on their own and strive for more integrated care for their patients, unless whole systems are involved, the options will continue to be somewhat limited. Access to care, as well as quality of life, may be improved in integrated models, and this may be sufficient motivation for patients and providers. However, costs are not likely to be reduced until larger systems are involved. As noted by Kilpatrick and colleagues,<sup>30</sup> not only changes in healthcare systems, but more coordinated efforts across systems would improve access and outcomes. These systems include criminal justice and victim assistance, as well as the health and mental health systems. The sharing of information and services across these systems would be the ideal, but because they are supported by separate funding streams, such integration seems unlikely. Even so, some programs have overcome some of these obstacles. The Center for Mental Health in Washington, DC provides comprehensive services to at-risk families with histories of violence and substance abuse that cut across generations. The Family Health Program, with integrated services, training, research, and advocacy aspects, was initially a

federally-funded demonstration project, but the funding has been taken over by Medicaid and local government.

Walker and colleagues suggest how patients with trauma-related medical and psychological problems and conditions could be supported in the healthcare system in a way that seems logical for a large medical organization like an HMO.<sup>31</sup> They discuss case-management approaches and special tracks in the primary care clinic that enhance early recognition of anxiety and depression that might otherwise appear as medically unexplained symptoms. This model focuses on stabilization of chronic problems, with the idea that initially high costs would be balanced out in the long run by lower costs, once the presenting problems were stabilized and maintenance care had taken over. However, while this model has much to offer clinically, and seems to address cost issues over the longer term, the authors point out that it is still not likely to be cost-effective in reality because of the high rates of turnover of patients in health plans. To Walker and colleagues, this dilemma suggests the importance of revisiting the issue of national health insurance.<sup>32</sup> Unless healthcare is "portable," the investment made in one setting will not benefit that setting, so it will not be cost-effective for plans to focus on long-term gains.

While these concerns require a commitment to changes in healthcare planning at the national level, it may be possible to implement some of them locally. The suggestions for integration of services seem likely to be helpful to patients and more satisfying for providers. As long as they do not increase costs, or the costs can be offset or otherwise absorbed, there will likely be little opposition to them. Creative thinking is required for services that are not likely to be covered by health plans at all. For example, some of the training activities could potentially be donated; educational literature could be obtained on the Internet; graduate students could provide educational workshops and behavioral interventions as part of their training; videotapes could be available or designed for patient education; the possibilities are endless. Although any one type of intervention may make only a small contribution, using the concept of allostatic support,<sup>33</sup> it may be that even small interventions can begin to reverse the downward spiral that follows the wear and tear caused by PTSD and other mental disorders and symptoms. All of these possibilities require collaboration among health professionals with different training. The differences can enhance care for survivors if they are explored and incorporated into health settings, rather than used to maintain barriers to more integrated care.

### **AN AGENDA FOR RESEARCH**

Although knowledge about the health consequences of traumatic exposure has grown substantially in recent years, more evidence is needed to document, understand, and treat these consequences. Given our view that a dis-

stress reaction is necessary to initiate the pathway from traumatic exposure to adverse physical health outcomes, we suggest that future research include measures of PTSD, and not only measures of traumatic exposure. Another important issue is a need for studies that assess morbidity by physical exam or laboratory tests. Most research on the health effects of trauma and PTSD has used self-report methods. Although self-reports are useful and valid, they are not synonymous with more objective measures, which are needed to confirm the link between PTSD and disease processes. There is a need for studies of large, representative samples that permit wide generalization of findings, including international samples. Except for studies of torture victims or refugees,<sup>26</sup> most research has focused on samples from North America or other developed countries. In low income or developing countries, where physical health may be poorer to begin with and where access to care may be more limited, the impact of trauma on health may be even more profound.

Many key questions remain unanswered. One is which physical disorders are, and are not, associated with PTSD. At present, a diverse range of disorders, involving multiple body systems, has been implicated. For example, one study found that PTSD was associated with increased incidence of arterial, dermatological, gastrointestinal, and musculoskeletal disorders.<sup>27</sup> There are behavioral and neurobiological reasons why PTSD could result in medical problems across multiple body systems,<sup>28,29</sup> but the breadth of PTSD's effects needs confirmation. Understanding which disorders are associated with PTSD would also help to discover the mechanisms through which PTSD leads to poor health. Better elaboration of biological pathways is needed, including evidence for allostatic load as an explanation for the health effects of PTSD. A useful strategy to enhance understanding of biological mechanisms is for investigators to include measures of health status in studies of neurobiological functioning.

Other questions concern the specificity of the effects of PTSD, versus disorders that are comorbid with PTSD. Research is needed to investigate the health consequences of significant distress reactions other than PTSD, and to distinguish the effects of PTSD from the effects of these other disorders. When possible, measures of PTSD and other types of distress should be used jointly because this approach will enable investigators to address both issues. In particular, depression researchers are encouraged to include measures of PTSD in studies of depression and health to identify the unique contribution of depression. A related issue about the specificity of PTSD was raised in the preceding section: does PTSD confer additional disease risk beyond genetic predisposition and other risk factors, and if so, are the results additive or interactive?

Next is the issue of treatment. It is necessary to know how interventions designed to reduce PTSD or other clini-

cally significant post-traumatic distress reactions affect health. Pennebaker<sup>30</sup> has argued that writing about traumatic experiences can improve health, and although most of the supporting evidence comes from studies in which participants have written about nontraumatic stressors, the evidence is sufficient to recommend further investigation. Among published PTSD treatment outcome studies, we found only one that measured physical health. Malik and colleagues, in a small randomized, placebo-controlled pilot study of fluoxetine, found that treatment improved domains such as vitality, social functioning, and mental health, but not physical functioning or general health perceptions.<sup>31</sup> Although these results are discouraging, larger studies are needed, including those with sufficiently long follow-up periods to observe changes in health.

It is also necessary to know how interventions designed to improve health status affect PTSD and other clinically significant distress reactions. A related question is whether trauma survivors need special health promotion interventions that target the ways in which their symptoms impede compliance with medical regimens or reduction of health-risk behaviors. For example, Rheingold and colleagues suggest that concurrent treatment of health-risk behaviors and trauma symptoms might be beneficial, but note that research does not indicate whether concurrent treatment or sequential treatment (PTSD then behavior, or behavior then PTSD) is best.<sup>32</sup>

A wide range of preventive, educational, and supportive interventions for trauma survivors need to be developed and tested for their efficacy in preventing or ameliorating trauma-related distress and their ability to improve physical health. Training for caregivers needs to be evaluated. System changes also need to be developed, implemented, and assessed; for example, assigning a case manager to work with trauma patients who are having difficulty in the healthcare system, or offering education groups to all new patients with trauma histories. Recent quality-improvement studies of depression<sup>33</sup> provide excellent models for these types of systems level interventions and assessments. Once these interventions have been tested for their effectiveness, they will need to be tested for their cost-effectiveness as well.<sup>34,35</sup>

More work is needed on the impact of trauma patients on the healthcare system, and the impact of the system on trauma patients at all levels.<sup>36</sup> Also, although there is no reason to expect that large systems will change in the near future, smaller research projects within HMOs or other closed systems, such as the Department of Veteran Affairs, can track the impact of new programs or alterations in the clinical management of trauma survivors over time, across all aspects of healthcare, to better understand effects on distress, health, and costs, as well as on patient and caregiver satisfaction.

Since Selye first published his classic work, *The Stress of Life*,<sup>26</sup> a great deal of research has investigated the relationship between stress and physical health. Most of this research has focused on stressors such as divorce, bereavement, and job loss, but some has examined the health effects associated with extreme stressors, including war, sexual victimization, disasters, and serious accidents. The evidence presented here shows that poor physical health should be recognized, along with mental health problems and impaired psychosocial functioning, as an outcome of traumatic exposure. PTSD and other clinically significant distress reactions are a key step in triggering the processes through which exposure affects health. These processes involve psychological, biological, behavioral, and attentional mechanisms that interact to strain the body's ability to adapt, thereby increasing the likelihood of disease and illness behavior. However, by addressing the physical health consequences of traumatic exposure in treatment and treatment systems, the burden on individuals and society may be reduced.

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